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SENNIGER POWERS
ONE METROPOLITAN SQUARE
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ST LOUIS, MO 63102

EXAMINER

CANTELMO, GREGG

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 01/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/038,782	Applicant(s) FRECH ET AL.	
	Examiner Gregg Cantelmo	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-77 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 19-40, 43, 47-61 and 66-77 is/are rejected.
- 7) ☒ Claim(s) 12-18, 41, 42, 44-46 and 62-65 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 7, 2005 has been entered.

Response to Amendment

2. In response to the amendment received November 7, 2005:
- a. Claims 1-77 are pending;
 - b. The 112 rejection of claims 40-52 is withdrawn;
 - c. The 102 rejection has been withdrawn in favor of a 103 rejection presented herein.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 52 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claim recites that the cross-linker is "derived

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from malonaldehyde” and while the specification makes mention of malonaldehyde, it does not provide reasonable support for derivatives of malonaldehyde as now claimed.

4. Claims 1-4, 19-40, 43, 47-50, 53, 57, 61, 66,70 and 74-77 rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the amine backbone being a poly(alkylamine), does not reasonably provide enablement for any and all other amines. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. In line with the argument presented in Applicants remarks to Rosenmeier lacking sufficient specificity to teach or suggest Applicant's invention, the instant claims and specification fail to reasonably teach of all amines being used in the manner recited in the instant claims. It appears that any and all examples provided in the application are drawn to various forms of PEI or PPI and no other amines, therefore the specification is held to only reasonably teach the use of such materials and lack sufficient specificity to other amine compounds. Further it would not be readily apparent that other materials were appreciated by the application as being suitable amine groups at the time the claimed invention was made. Applicant is advised to amend the claims to include the enabled poly(alkylamine) materials supported in the original description.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claim 52 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claim recites that the cross-linker is "derived from malonaldehyde" but it is unclear what derivatives this term encompasses and the instant application fails to clearly define the derivatives in this manner. Thus the scope of claim 52 is indefinite.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5, 6, 8-10, 32, 34-36, 49, 51 and 57-59 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 62-140306 (JP '306).

JP '306 discloses a cross-linked polymer electrolyte having a polymer backbone material branched polyethylenimine with a polyfunctional epoxy cross-linking agent and a metal salt, the materials exemplified being inert to lithium (abstract as applied to claim 1).

As discussed above the polymer backbone can be linear or branched polyethylenimine (as applied to claims 5, 6, 8-10).

The polymeric material having an inherent degree of elasticity (as applied to claim 30).

The metal salt is an alkali metal salt (abstract to claims 32 and 34-36).

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As discussed above the polymer backbone can be linear or branched polyethylenimine (as applied to claims 54-56).

JP '306 discloses a cross-linked polymer electrolyte having a polymer backbone material branched polyethylenimine with a polyfunctional epoxy cross-linking agent and a metal salt in the absence of a protic solvent, the term as described relative to the instant application (abstract as applied to claim 49).

As discussed above the polymer backbone can be linear or branched polyethylenimine (as applied to claims 51).

JP '306 discloses a cross-linked polymer electrolyte used for primary or secondary batteries (thus having opposing electrodes separated by an electrolyte) having a polymer backbone material branched polyethylenimine with a polyfunctional epoxy cross-linking agent and a metal salt, the materials exemplified being inert to lithium (abstract as applied to claim 57).

As discussed above the polymer backbone can be linear or branched polyethylenimine (as applied to claims 58-59).

JP '306 discloses a cross-linked polymer electrolyte used for primary or secondary batteries (thus having opposing electrodes separated by an electrolyte) having a polymer backbone material branched polyethylenimine with a polyfunctional epoxy cross-linking agent and a metal salt which generates an ion pair of lithium ions and the corresponding negative ion from the salt, the lithium ions being capable of diffusing through the polymer electrolyte and the negative ions being attracted to and covalently bonded to the electrolyte backbone (abstract as applied to claim 66).

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As discussed above the polymer backbone can be linear or branched polyethylenimine (as applied to claims 67-68).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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7. Claims 1, 2, 5-11, 30, 32, 34, 49, 53-60 and 66-73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of JP '306.

Rosenmeier discloses a battery comprising electrodes (col. 9, ll. 49-55) a cross-linked polymer electrolyte having a polymer backbone material including both linear and branched polyethylenimine (col. 5, ll. 60-61) a cross-linker (paragraph bridging column 6) and a metal salt (col. 9, ll. 22-28 as applied to claim 57).

As discussed above the polymer backbone can be linear or branched polyethylenimine (as applied to claims 58-60).

Rosenmeier discloses a battery comprising electrodes (col. 9, ll. 49-55) a cross-linked polymer electrolyte having a polymer backbone material including both linear and branched polyethylenimine (col. 5, ll. 60-61) a cross-linker (paragraph bridging column 6) and a metal salt (col. 9, ll. 22-28 as applied to claim 57).

The salt mixture includes an ion pair (col. 9, ll. 22-28) wherein the lithium ions are capable of diffusing through the electrolyte upon application of an electric field between the opposite electrodes and the other ion attaches to the polymer backbone (as applied to claims 65, 66 and 70).

As discussed above the polymer backbone can be linear or branched polyethylenimine (as applied to claims 67-69 and 71-73).

While Rosenmeier disclose a list of various polymers which may or may not be crosslinked, upon further consideration it would appear that Rosenmeier fails to anticipate the combination.

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However, given the overall disclosure of Rosenmeier there is a reasonable expectation that any of the polymer materials listed in column 5 would have provided suitable equivalent backbone structures for the polymer electrolyte.

In addition, Rosenmeier suggests that the polymer may or may not be cross-linked.

While Rosenmeier does not specifically teach or exemplify the claimed polymer electrolyte, Rosenmeier does suggest the use of linear or branched polyethylenimine as the polymer material and thus is reasonable to suggest to one of ordinary skill in the art to the use of such a material.

Furthermore Rosenmeier suggests that the polymer can be cross-linked and thus in selection of any of the polymer species, including PEI, would further suggest that the polymer can in fact be cross-linked if desired.

JP '306 discloses providing a polyelectrolyte having a polyethyleneimine backbone which is mixed with various crosslinkers (abstract).

8. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of JP '306 as applied to claims 1-2 above and further in view of JP 06-329793 A (JP '793).

The teachings of claims 1 and 2 have been discussed above and are incorporated herein.

The difference between claims 3 and 4 and Rosenmeier is that Rosenmeier does not disclose of the ionic conductivity of the membrane.

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JP '793 is drawn to a polymer electrolyte membrane having a PEI backbone which is further crosslinked to form an electrolyte membrane having an ionic conductivity of up to 1×10^{-3} S/cm (abstract and paragraph [0018]).

The motivation for providing an electrolyte membrane as taught by JP '793 is that it improves the ionic transport across the electrolyte membrane therefore improving the charge and discharge properties of the battery (paragraph [0019]).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Rosenmeier by providing a polymer membrane having an ionic conductivity as taught by JP '793 since it would have improved the charge and discharge property of the battery. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

9. Claims 19-22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of JP '306 as applied to claim 1 above and further in view of Paul (of record).

The teachings of claim 1 have been discussed above and are incorporated herein.

The differences between claim and Rosenmeier are that Rosenmeier does not disclose of the particular cross-linking agents.

Rosenmeier discloses that the polymer backbone such as linear or branched PEI can be cross-linked in forming the polymer electrolyte membrane.

Paul discloses a polymer electrolyte (abstract) comprising a cross-linked PEI electrolyte in the polymer backbone and a dissolved or dispersed metal salt therein (abstract as applied to claim 1). The film has a conductivity of at least about 10^{-4} S/cm at about 60° C (col. 3, ll. 14-16 as applied to claim 4). The electrolyte comprises cross-linked branched PEI (title as applied to claims 5, 6, 8, 9, 31). The repeating unit comprises -X-N- (note that the R substituent is optional) wherein X is ethylene (col. 3, ll. 5-10 as applied to claim 10).

The plasticizer is a swelling solvent (col. 3, ll. 36-44 as applied to claims 19 and 25).

In the case of the plasticizer, it is added about 10-70% to the total electrolyte (col. 3, ll. 46-59 as applied to claims 20-22).

The motivation for using a plasticizer as taught by Paul is that it enables the salt concentration to be increased to optimize the nitrogen to metal ion ratio (col. 3, ll. 45-49 as applied to claims 19-22 and 25).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Rosenmeier by adding a plasticizer as taught by Paul since it would have enabled the salt concentration to be increased and optimized the nitrogen to metal ion ratio.

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10. Claims 23, 24, 26 and 29 rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of JP '306 and Paul as applied to claims 1, 19 and 25 above, and further in view of Daroux, of record.

The teachings of claims 1, 19-22 and 25 have been discussed above and are incorporated herein.

The differences not yet discussed are of the particular plasticizers in claims 23, 24, 26 and 29.

As evident from the teachings of Paul, it is known to provide a plasticizer in the PEI polymer electrolyte. The presence of a plasticizer enables solvating of the metal ions in the electrolyte and increase the salt concentration in the polymer (col. 3, ll. 37-40 and 46-48).

Daroux teaches that various plasticizer materials including polyethylene glycol, glymes and propylene carbonate are known to be used in the polymer electrolyte (col. 8, ll. 9-28 as applied to claims 23, 24, 26 and 29).

Daroux teaches that any of these materials can be used to produce the electrolyte for the purpose of enhancing the solubility of the salt in the polymeric electrolyte and enhanced the conductivity of the electrolyte (col. 8, ll. 15-20).

The motivation for selecting either polyethylene glycol, glymes or propylene carbonate is that they all enhance the solubility of the salt in the polymeric electrolyte and enhance the conductivity of the electrolyte and as shown by Daroux are equivalent materials for such purposes.

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Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Rosenmeier in view of Paul by selecting either polyethylene glycol, glymes or propylene carbonate since they would have each enhanced the solubility of the salt in the polymeric electrolyte and enhanced the conductivity of the electrolyte and as shown by Daroux are equivalent materials for such purposes. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

11. Claims 23, 26, 28 and 29 rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of JP '306 and Paul as applied to claims 1, 19 and 25 above, and further in view of Grunwald, of record.

The teachings of claims 1, 19 and 25 have been discussed above and are incorporated herein.

The differences not yet discussed are of the particular plasticizers in claims 23, 24, 26 28 and 29.

As evident from the teachings of Paul, it is known to provide a plasticizer in the PEI polymer electrolyte. The presence of a plasticizer enables solvating of the metal ions in the electrolyte and increase the salt concentration in the polymer (col. 3, ll. 37-40 and 46-48).

Grunwald teaches that various plasticizer materials including polyethylene glycol, dibutyl phthalate and propylene carbonate are known to be used in the polymer electrolyte (col. 8, ll. 9-28 as applied to claims 23, 24, 26 and 29).

Daroux teaches that any of these materials can be used to produce the electrolyte for the purpose of enhancing the solubility of the salt in the polymeric electrolyte and enhanced the conductivity of the electrolyte (col. 8, ll. 15-20).

The motivation for selecting either polyethylene glycol, glymes or propylene carbonate is that they all enhance the solubility of the salt in the polymeric electrolyte and enhance the conductivity of the electrolyte and as shown by Daroux are equivalent materials for such purposes.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Rosenmeier in view of Paul by selecting either polyethylene glycol, glymes or propylene carbonate since they would have each enhanced the solubility of the salt in the polymeric electrolyte and enhanced the conductivity of the electrolyte and as shown by Daroux are equivalent materials for such purposes. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

12. Claims 23, 26, 28 and 29 rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of JP '306 and Paul as applied to claims 1, 19 and 25 above, and further in view of U.S. patent No. 5,964,903 (Gao), of record.

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The teachings of claims 1, 19 and 25 have been discussed above and are incorporated herein.

The differences not yet discussed are of the weight of the solvent in the electrolyte mixture (claims 20-22) and of the particular solvents/plasticizers in claims 26-29.

With respect to the weight of the solvent (claims 20-22):

Gao teaches that the weight ratio of the plasticizer is from about 1-50 wt. %, more preferably about 10-30 wt. % (col. 4, ll. 1-17 as applied to claims 20 and 21). 1 wt. % and about 10 wt. % constitute data points which fall within the range of claim 22.

The motivation for providing the plasticizer in the weight ratio of Gao is that it enhances the degree of absorption of the salt in the polymer electrolyte.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Paul by selecting the weight of the solvent to be within the ranges taught by Gao since it would have enhanced the degree of absorption of the salt in the polymer electrolyte.

With respect to the particular solvents/plasticizers (claims 26-29):

As evident from the teachings of Paul, it is known to provide a plasticizer in the PEI polymer electrolyte. The presence of a plasticizer enables solvating of the metal ions in the electrolyte and increase the salt concentration in the polymer (col. 3, ll. 37-40 and 46-48).

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Gao teaches that plasticizers comprise 2-(2-ethoxyethoxy) ethyl acetate, dimethyl adipate, dibutyl phthalate, propylene carbonate, and mixtures thereof (abstract as applied to claims 26-29).

The motivation for selecting the plasticizers of Gao is that it can improve the solubility of the salt while be easily removed from the polymer (col. 3, ll. 19-35).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Rosenmeier in view of Paul by selecting the plasticizers of Gao since it would have improved the solubility of the salt while being easily removed from the polymer. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

13. Claims 33, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of JP '306 as applied to claim 32 above and further in view of U.S. patent No. 5,964,903 (Gao).

The teachings of claim 32, with respect to Rosenmeier, have been discussed above and are incorporated herein.

The differences between claims 33, 35 and 36 and Rosenmeier are that Rosenmeier does not disclose of the alternative metal salts.

Gao discloses of using various metal salts (col. 5, ll. 28-40).

The motivation for selecting the particular metal salt is dependent upon the type of battery designed and one of ordinary skill in the art would have recognized that any

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number of metal salts can be used in the electrolyte as taught by Gao to impart ionic transport across the membrane.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Rosenmeier by replacing the salt of Rosenmeier with the salts taught by Gao since selection of the salt is dependent upon the particular battery design. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

14. Claims 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of JP '306 as applied to claim 32 above and further in view of Harris (of record).

The teachings of claim 32, with respect to Rosenmeier, have been discussed above and are incorporated herein.

The differences between claims 37-38 and Rosenmeier are that Rosenmeier does not disclose of the ratio of nitrogen atoms.

Harris discloses of controlling the ratio of secondary and tertiary nitrogen atoms in PEI electrolytes for the purposes of improving the conductivity of the nitrogen based polymer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Rosenmeier by controlling

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the ratio of the nitrogen atoms in the PEI since it would have improved the conductivity of the polymer.

15. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of JP '306, Daroux and U.S. patent No. 4,578,326 (Armand).

The teachings of claim 1, with respect to Rosenmeier, have been discussed above and are incorporated herein.

The difference between claims 39 and Rosenmeier is that Rosenmeier does not disclose of the ratio of heteroatoms to ions.

Daroux discloses providing heteroatoms in the polymer membrane.

The polymeric macromolecular material could contain electronegative heteroatoms, such as etheric oxygens, which are capable of associating with the cationic species of the salt thereby making it an ideal component of a solid electrolyte for use in solid electrolyte cells (Daroux, paragraph bridging columns 7 and 8).

Armand discloses that the ratio of the number of heteroatoms to the number of atoms of the alkaline metal of the ionic compound is generally comprised between 4 and 30, and preferably between 8 and 24 (col. 5, ll. 29-36). Also see col. 6, ll. 15-18).

The motivation for selecting this ratio is that the pairs of free electrons on these heteroatoms enhances the ionic conductivity of the polymer.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Rosenmeier by providing heteroatoms in the polymer in a preferred arrange between 8-24 heteroatoms to metal ions since it would have improved the ionic conductivity of the polymer. Generally,

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differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

16. Claims 74-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenmeier in view of U.S. patent Nos. 3,885,069 (Roberts).

The teachings of claims 1 and 2 have been discussed above and are incorporated herein.

The differences between claims 74-77 and Rosenmeier are that Rosenmeier does not disclose of the particular cross-linking agents.

Rosenmeier discloses that the polymer backbone such as linear or branched PEI can be cross-linked in forming the polymer electrolyte membrane.

A variety of di- and polyhalogenated organic compounds, other than that illustrated by the use of 1,2-dichloroethane, have been employed in the investigative work which led to the process of this invention, as initiators and crosslinking agents in the polymerization of ethylenimine (col. 2, ll. 10.20 of Roberts).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Rosenmeier by selecting the cross-linker to be a material taught by Roberts since it would have provide a sufficient cross-linker material for crosslinking the PEI polymer of Rosenmeier. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S.

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327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07

Response to Arguments

17. Applicant's arguments with respect to claim 1-11 and 66-77 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

18. Claims 41, 42, 44-46 and 62-65 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With respect to claims 40-48, allowable subject matter can be found in the previous office action, incorporated herein.

With respect to claims 61-65: none of the prior art of record appears to teach, fairly suggest or render obvious the invention of claim 61. In particular: of the gradient battery comprising both electrodes comprising a cross-linked poly(amine) in combination with the electrolyte defined therein.

These claims recite the enabled poly(alkylamines) as compared to the broader independent claims upon which these claims are dependent upon which broadly recite a polymer electrolyte containing amine groups.

19. Claims 12-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject

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matter: none of the prior art of record appears to teach, fairly suggest or render obvious the invention of claim 12 wherein the copolymer has two or more different repeat units as defined in claim 10 or of the repeat units of a copolymer as defined in claim 16.

Conclusion

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (571) 272-1283. The examiner can normally be reached on Monday to Thursday from 9 a.m. to 6 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-272-8300. FAXES received after 4 p.m. will not be processed until the following business day. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Gregg Cantelmo
Primary Examiner
Art Unit 1745

gc

January 23, 2006

